Smart Approach for Public Transport

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Abstract— *This paper is to provide public a Smart Assistance in Public Transport System. The paper is to be implemented for public bus (for PMTs in Pune). It has the entire smart assistance system required for public security and safety. The smart system includes safety form rash driving as well. It has accident detection and monitoring facility. It also has user friendly application for user to track bus on smart their phones. The smart system designed has both online (GPS) and offline (GSM) for user friendly service. It allows user to save its time by acknowledging no. of persons present in the bus as well as no. of seats available in the bus along with the current and next stop acknowledgment with its arrival timings. It also has ramp facility for handicap people. The system also many additions feature to make public transport system an intelligent and easy to use system so that public can take smart advantage of it. The system is specially designed for Smart Cities as it's the recent development plan.*

Keywords—ARM processor, Accelerometer, PIR sensor, RFID unit, GPS/GSM unit.

I. INTRODUCTION

Smart city is very much important for developing country. The smart life of today makes us to arrive at our destination as soon as possible. The changing lifestyle is also important with the safety and comfort of vehicle is becoming an important factor. Development of technology has allowed the concept of an intelligent transport system. Now a day's tremendous growth increases in transport system. The system proposed in this paper states smart way to public transport. Considering all the public issues and problems such as; time, easy of transport, safety and user-friendly environment this system is been proposed.

II. PROPOSED SYSTEM

Here the design and implementation of smart public transport system for smart cities is proposed. A detailed survey concluded for implementation of various features to the system prototype. Features such as; smart application for user friendly use, GPS/GSM system interface, emergency and bus fail switch, etc are included. The following is detail description of features.

2.1 Accident detection acknowledgement

Now-a-days many accidents are recorded through public transport. The main reason to add this feature is to know the exact location of the vehicle via. GPS/GSM technology. Whenever an accident is been detected, each system is having a dedicated GPS/GSM unit which will help to collect the location details via. GPS and send them to registered police station and PMT office via. GSM unit through SMS. This will help to make a better reach-out for the system which needs help.

2.2 Emergency and bus fail switch

In case of any emergency (such as women/child safety), this switch is been pressed then it sends acknowledgement via. SMS to the registered mobile no. and police station to help out the victim. This SMS contains

2.3 User friendly smart app

This feature is specially designed for each and every single user of public transport. Through this app, the user can initial arrival and departure time of the bus. They can also track current location of the bus and also, they can pre-acknowledge the travelers in the bus. This will help them save their time.

2.4 Drunk and drive authentication

This feature is been added to take extra care of public been travelling through transport. If the driver is been detected to be drunk, then a direct acknowledgement via. SMS is sent to PMT office that driver is been drunk the driver needs to be changed. The SMS contains bus no. and location.

III. RELATED WORK

The basic idea for offline tracking of vehicle is to be implemented. Following papers are been surveyed to implement the paper.

In previous works provided in SeokJu Lee[1], they have implement bus vehicle tracking for UCSI university, kuala

Lumpur, Malaysia. It is implemented for fixed route, providing students with status of bus after specified time interval using LED panel smart phone application. Technology used is Ardunio microcontroller Atmega328 based Ardunio UNOR3 microcontroller. Also, for GPS, GSM/GPRS module the same controller is used. Software

program to control them is written in C programming language, complied and then saved in microcontroller's flash memory. The testing results in this paper provide; testing in-vehicle device, testing web server and database, testing smart phone application.

In Pengfei Zhou[2], predicting bus arrival time with mobile phones is given. Technology used is participatory sensing of user. This prototype system with different types of Android based mobile phones and comprehensively experiment with the NTU campus shuttle buses as well as Singapore buses over a 7-week period, then followed by London in 4-weeks. The proposed system is solution is more generally available and is energy friendly. The evaluation results suggest that the proposed system achieves outstanding prediction accuracy compared with those operator initiated and GPS support solutions. The prototype system predicts bus arrival time with average error of 80 sec.

In C.Prabha[3], This paper presents vehicle accident detection and alert system with SMS to the user defined mobile numbers. The GPS tracking and GSM alert based algorithm is designed and implemented with LPC2148 MCU in embedded system domain. The proposed Vehicle accident detection system can track geographical information automatically and sends an alert SMS regarding accident. Experimental work has been carried out carefully. The result shows that higher sensitivity and accuracy is indeed achieved using this project. EEPROM is interfaced to store the mobile numbers permanently. This made the project more user-friendly and reliable. The proposed method is verified to be highly beneficial for the automotive industry.

In M. A. Hannan[4], This paper deals with the implementation of an intelligent bus monitoring system. In this system, radio frequency identification (RFID) and integrated sensing technologies such as global positioning system (GPS), general packet radio service (GPRS) and geographic information system (GIS) are used to monitor the movement of a bus. A new theoretical framework and ruled based decision algorithms are developed for the system. An experimental setup is developed for the prototype implementation. The ability of the system to act on its own can reduce the manpower required at the monitoring center. Bus drivers will also be more punctual to the bus schedules that have been established, resulting in a more efficient bus circulation system. The experimental results show that the system is intelligent enough and able to provide important information to the authorities for monitoring and management of the bus system.

In Mashood Mukhtar[5], the paper states that, the system proposed tracks the location of a particular vehicle on the user's request and responds to the user via SMS. The received SMS contains longitude and latitude that is used to locate the vehicle on the Google maps. The vehicle tracking system allows a user to: remotely switch ON the vehicle's ignition system, remotely switch OFF the vehicle's ignition system, remotely lock the doors of the vehicle, remotely unlock the doors of the vehicle, and remotely track a vehicle's location. Some changes were made in which most notable change was alteration of the tracking methodology (i.e. Access to 32 channels of satellites instead of 3). The vehicle tracking system was built successfully. However, the vehicle tracking system could be made more robust by using more accurate GPS unit.

IV. DEVLOPMENT OF PROPOSED SYSTEM

This system is designed for single vehicle as shown in fig.1. This system consist of ARM7, GPS/GSM modem, DC motor, Switches, PIR sensor and a smart phone are the main components. The microprocessor based embedded system has many different features such as high performance, architectural simplicity, cost sensitive and low power consumption.

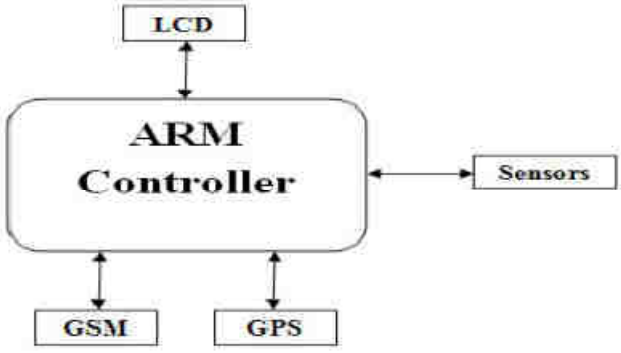

Fig.1: Block Diagram of proposed system.

The proposed system has following advantages;

[1] The system has an alcohol sensor which checks the level of alcohol in driver's breadth. This helps to prevent accidents caused due to 'drinking and driving'.

[2] The system has an accelerometer used to detect accidents and an acknowledgement message is been sent to registered number so that quick action can be taken for victims.

[3] The system has three switches i.e. handicap ramp switch, emergency switch and system fail switch. At every press of switch an acknowledgement message is sent to registered number.

[4] The system also has GPS/GSM module, a miscall alert is given on GSM system then, a message is been sent on registered number in which real-time co-ordinates on the system is available. It helps in off-line tracking of the system.

[5] The system also has temperature monitoring.

[6] The system also has RFID authentication for driver.

Also, many additional features make system smart, reliable and public friendly. The following fig. represents flow for smart app design for user.

The smart app designed helps user to track the system at real-time location and also provides no. of persons currently available in the system so that if the no. of persons is more than accepted the user can easily look for another bus.

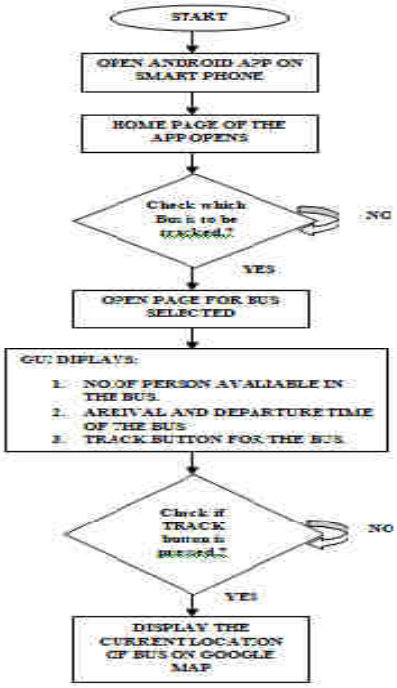

Fig. 2: Flow for smart app for user.

V. EXPERIMENTAL SET UP AND RESULTS

Top and front view of system prototype module is as shown in fig. Here some results of system are shown below. The other safety messages like bus fail, rash driving, alcohol detection, etc are displayed on LCD and SMS acknowledgement is sent via GPS/GSM system as shown below. Also, result of online app designed for system is also shown.

Fig.2: Top view of experimental set up.

Fig.3: Front view of experimental set up.

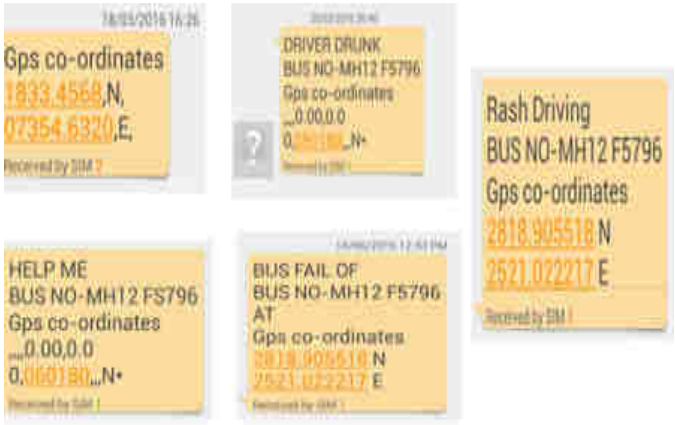

Fig. 4: GSM results of the system.

Fig. 5: GUI of user application for system.

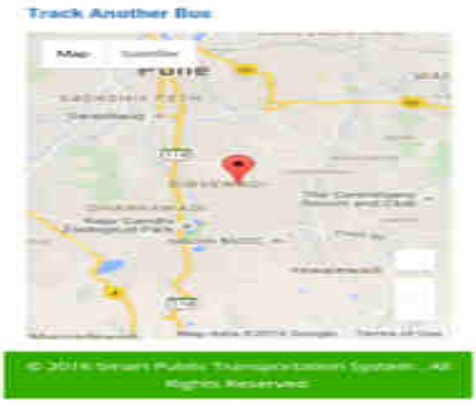

Fig.6: Location tracking on smart app designed for public.

VI. CONCLUSION & FUTURE SCOPE

The system to be designed is fully secured and smart assisted public system. The implementation of the system is to be done for bus. ARM7 processor is used as controller to control the whole processing. A system prototype is developed for testing of three sensors i.e. accelerometer, bus fail switch and PIR sensors. The results for tracking of the system are taken real-time. The GPS/GSM results are also taken at real-time. The system can be future implemented for private sectors and in public sectors for trains and luxuries. The additional features like upper-dipper, pollution control, etc can be added.

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